[Claims]

[Claim 1]

A ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to a residential area, characterized in that a bypass passage for introducing the outside air, whose heat is exchanged by the heat-recovery type ventilating unit, in the residential area bypassing the air-conditioning unit is provided.

[Claim 2]

A ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to each of residential areas, characterized in that an introduction duct for introducing air inside a room to the air-conditioning unit from the residential area is connected with a supply duct for introducing the air conditioned by the air-conditioning unit in the residential area by a bypass duct, and dampers are provided to the introduction duct in an area upstream of the bypass duct, and the bypass duct.

[Claim 3]

A ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to each of residential areas, characterized in that a damper closable at the time of a ventilating operation is provided to

an introduction duct for introducing air inside a room to the air-conditioning unit from the residential areas.

[Detailed Description of the Invention]

[0001]

[Industrial Application Field]

The present invention relates to a ventilating and air-conditioning device, for example, with a heat-recovery type ventilation unit.

[0002]

[Conventional Art]

Generally, a ventilating and air-conditioning device is known which cools and heats a room while ventilating the room in combination of a sensible heat-recovery type ventilating unit and a cooling-heating air-conditioning unit. Figure 3 shows an example of a conventional ventilating and air-conditioning device.

[0003]

With reference to Figure 3, 51 denotes a sensible heat-recovery type ventilating unit, and 53 denotes a cooling-heating air-conditioning unit. The ventilating unit 51 exchanges heats of air RAB sucked through a first blower 61 from each of rooms in a non-residential area (for example, a bathroom) and outside air OA sucked through a second blower 63 by a heat exchanger 64, and then supplies the heat-exchanged air to an inlet of the cooling-heating air-conditioning unit 53.

[0004]

The cooling-heating air-conditioning unit 53 sucks the above-mentioned outside air OA and air RAA sucked through a third blower 65 from an intake port in each of residential areas, exchanges the heats of the air in the unit 53, in which a heat exchanger 57 is built, and thereafter, supplies the conditioned air SA to the respective residential areas. Thereby, while the

air RAB from the non-residential area is exhausted to the outside of a building through the ventilating unit 51 as exhaust air EA, almost the same amount of the outside air OA as the exhaust amount is introduced in the building through the ventilating unit 51, so that the air can be conditioned in each of the residential areas.

[0005]

[Problems to be Solved by the Invention]

The ventilating and air-conditioning device with the above-mentioned constitution can operate only for ventilation while stopping a cooling or heating operation, for example, in an intermediate period.

[0006]

However, a ventilating and air-conditioning device with a conventional constitution has a problem that not only the first and second blowers 61, 63, but also the third blower 65 must be operated at the time of the operation only for ventilation.

[0007]

For example, when the operation of the third blower 65 is stopped and the ventilating operation is done only by the operations of the first and second blowers 61 and 63, the air fed through the second blower 63 flows in a path with a small pressure loss, as a result of which the air flows to the intake port of each of the residential areas (original RAA side). In this manner, when the ventilation air flows in the intake port of each of the residential areas, the ventilation air flows directly to the non-residential area and fresh outside air can not be fed to the residential area, to which the ventilation air must be actually fed because the intake ports are generally provided in corridors and halls of each of the residential areas.

[0008]

Therefore, as explained in the introductory part, conventionally all of the blowers 61, 63 and 63 are operated even in the operation only for ventilation.

[0009]

In such an operation, although about 20% of a flow volume of the ventilation air is theoretically enough, the air RAA is sucked from the intake port and the ventilation air is further sucked, which requires about 40% of the flow volume. Accordingly, running costs for the ventilating operation with this ventilating and air-conditioning device are increased, which causes a problem.

[0010]

Thus, an object of the present invention is to provide a ventilating and air-conditioning device which solves the above-mentioned problem of the conventional art, and which can make the running costs at the time of the ventilating operation lower than before.

[0011]

[Means for Solving the Problems]

To achieve the above-mentioned object, a first invention is a ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to a residential area, the device further comprising a bypass passage for introducing the outside air, whose heat is exchanged by the heat-recovery type ventilating unit, in the residential area bypassing the air-conditioning unit.

[0012]

A second invention is a ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit

and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to each of residential areas, wherein an introduction duct for introducing air inside a room to the air-conditioning unit from the residential area is connected with a supply duct for introducing the air conditioned by the air-conditioning unit in the residential area by a bypass duct, and dampers are provided to the introduction duct in an area upstream of the bypass duct, and the bypass duct.

[0013]

A third invention is a ventilating and air-conditioning device, which comprises a heat-recovery type ventilating unit and an air-conditioning unit, introduces outside air, whose heat is exchanged with heat of exhaust air by the heat-recovery type ventilating unit, into the air-conditioning unit, conditions the air, and supplies it to each of residential areas, wherein a damper closable at the time of a ventilating operation is provided to an introduction duct for introducing air inside a room to the air-conditioning unit from the residential areas.

[0014]

[Operation]

According to the first invention, in the ventilating operation, the outside air, whose heat is exchanged by the heat-recovery type ventilating unit is introduced to a residential area bypassing the air-conditioning unit. Therefore, the ventilating operation can be done without the operation of the blower of the air-conditioning unit, which reduces running costs accordingly.

[0015]

According to the second invention, in the ventilating operation, the damper of the introduction duct is closed and the

damper of the bypass duct is opened. Therefore, the ventilating operation can be done without the operation of the blower of the air-conditioning unit, which reduces running costs.

[0016]

According to the third invention, in the ventilating operation, the damper of the introduction duct is closed. Therefore, the ventilation air does not flow in the intake port in the residential area, which improves efficiency of the ventilating operation.

[0017]

[Embodiments]

The embodiments of the ventilating and air-conditioning device according to the present invention will be explained with reference to the drawings.

[0018]

In Figure 1, reference number 1 denotes a sensible heat-recovery type ventilating unit, and 3 denotes a cooling-heating air-conditioning unit. The sensible heat-recovery type ventilating unit 1 exchanges the heats of the air RAB sucked through a duct 11 and a first blower 21 from each of rooms in a non-residential area (for example, a bathroom) and the outside air OA sucked through a duct 12 and a second blower 23 by a heat exchanger 4, and then supplies the heat-exchanged air to the inlet of the cooling-heating air-conditioning unit 3 through the duct 13.

[0019]

The cooling-heating air-conditioning unit 3 sucks the outside air OA and the air RAA sucked through an introduction duct 14 (a below-described damper 17 is opened) and a third blower 25 from the intake port of each of residential areas, exchanges the heats of the airs by the heat exchanger 7 in the cooling-heating air-conditioning unit 3, and then supplies the

conditioned air SA to the respective residential areas through a supply duct 15. Thereby, while the air RAB from the non-residential area is exhausted to the outside of a building through the ventilating unit 1 as exhaust air EA, almost the same amount of the outside air OA as the exhaust amount is introduced in the building through the sensible heat-recovery type ventilating unit 1, so that the air can be conditioned in each of the residential areas.

[0020]

Thus, in this embodiment, with reference to Figure 1, the introduction duct 14 is connected with the supply duct 15 by a bypass duct 16, and open-close type dampers 17 and 18 are provided to the introduction duct 14 in an area upstream of the bypass duct 16, and the bypass duct 16, respectively.

[0021]

Figure 1 shows ventilating and air-conditioning operations, in which the damper 17 is opened and the damper 18 is closed.

[0022]

According to this embodiment, in addition to the above-mentioned ventilating and air-conditioning operations, the ventilating operation can be done while the cooling or heating operation is stopped.

[0023]

In this ventilating operation, as shown in Figure 2, first the damper 17 is closed and the damper 18 is opened. Then, the first and second blowers 21 and 23 are operated, and the third blower 25 is stopped. When the third blower 25 is stopped, the outside air OA, whose heat is exchanged by the sensible heat-recovery type ventilating unit 1, normally flows in a path with a small pressure loss. For example, it flows in the intake port of each of the residential areas (original RAA side).

[0024]

Also, in another embodiment, only not to flow the outside air OA in the intake port of each of the residential areas (original RAA side) in the ventilating operation, the damper 17 only needs to be provided to a conventional constitution (Figure 3).

[0030]

In this case, only in the ventilating operation, the above-mentioned damper 17 is controlled to be closed. However, in this case, the third blower 25 is operated in the ventilating operation, so the running costs cannot be reduced to a greater extent.

[0031]

Briefly, in each of the above-mentioned embodiments, the outside air OA does not flow in the intake ports of the residential areas (original RAA side) in the ventilating operation, so that efficiency of the ventilating operation can be improved compared to before.

[0032]

[Advantages of the Invention]

As is apparent from above explanation, according to the first invention, the bypass passage for introducing the outside air, whose heat is exchanged by the heat-recovery type ventilating unit in the residential areas bypassing the air-conditioning unit is provided, so that the ventilation operation can be done without the operation of the blower of the air-conditioning unit, which can reduce running costs.

[0033]

The second invention is more specific. In the second invention, an introduction duct for introducing air inside a room to the air-conditioning unit from the residential area is connected with a supply duct for introducing the air conditioned by the air-conditioning unit in the residential area by a bypass

duct, and dampers are provided to the introduction duct in an area upstream of the bypass duct, and the bypass duct. Therefore, when the damper of the introduction duct is closed and the damper of the bypass duct is opened in the ventilating operation, the ventilating operation can be done without the operation of the blower of the air-conditioning unit, which can reduce running costs.

[0034]

According to the third invention, the damper closable in the ventilating operation is provided to the introduction duct for introducing the air inside the room to the air-conditioning unit from the residential areas is provided. Therefore, when the damper is closed in the ventilating operation, a flow of the ventilation air into the intake ports of the residential areas can be prevented, which can improve efficiency of the ventilating operation.

[Brief Description of the Drawings]

[Figure 1]

Figure 1 is a schematic diagram showing one embodiment of a ventilating and air-conditioning device according to the present invention.

[Figure 2]

Figure 2 is a schematic diagram showing the position of a damper in a ventilating operation.

[Figure 3]

Figure 3 is a schematic diagram showing a conventional ventilating and air-conditioning device.

[Description of Symbols]

1 ventilating unit

3 air-conditioning unit

14 introduction duct

15 supply duct

17, 18 dampers

Figure 1

RAB FROM EACH ROOM (NON-RESIDENTIAL AREA)

RAA FROM EACH ROOM (RESIDENTIAL AREA)

SA TO EACH ROOM (RESIDENTIAL AREA)

OA OUTSIDE AIR OA

EA EXHAUSTED

Figure 2

RAB FROM EACH ROOM (NON-RESIDENTIAL AREA)

RAA FROM EACH ROOM (RESIDENTIAL AREA)

SA TO EACH ROOM (RESIDENTIAL AREA)

OA OUTSIDE AIR OA

EA EXHAUSTED

Figure 3

RAB FROM EACH ROOM (NON-RESIDENTIAL AREA)

RAA FROM EACH ROOM (RESIDENTIAL AREA)

SA TO EACH ROOM (RESIDENTIAL AREA)

OA OUTSIDE AIR OA

EA EXHAUSTED

However, in this state, the damper 17 of the duct 14 is closed, and so the air does not flow in the intake port of each of the residential areas.

[0025]

The intake ports of the residential areas (original RAA side) are normally provided in corridors and halls. Therefore, when the outside air OA flows to the intake ports, the ventilation air flows directly to the non-residential area (for example, a bathroom), and flows to the sensible heat-recovery type ventilating unit 1 as the air RAB therefrom. In this case, fresh outside air cannot be fed to the residential area, to which the ventilation air must be actually fed.

[0026]

Therefore, in this embodiment, the damper 18 of the bypass duct 16 is open, through which the outside air OA flows in each of the residential areas.

[0027]

In this case, the outside air OA flows through the bypass duct 16 bypassing the air-conditioning unit 3. Thus, a bypass passage for introducing the outside air OA, whose heat is exchanged by the sensible heat-recovery type ventilating unit 1, in the residential area bypassing the air-conditioning unit 3 is constituted.

[0028]

In this manner, fresh air can be fed to the residential areas through the bypass duct 16 without the operation of the third blower 25. Accordingly, this non-operation of the third blower 25 can reduce a flow volume of the ventilation air, restrain the flow volume to about 20%, and make the running costs of the ventilation operation of the ventilating and air-conditioning device low.

[0029]